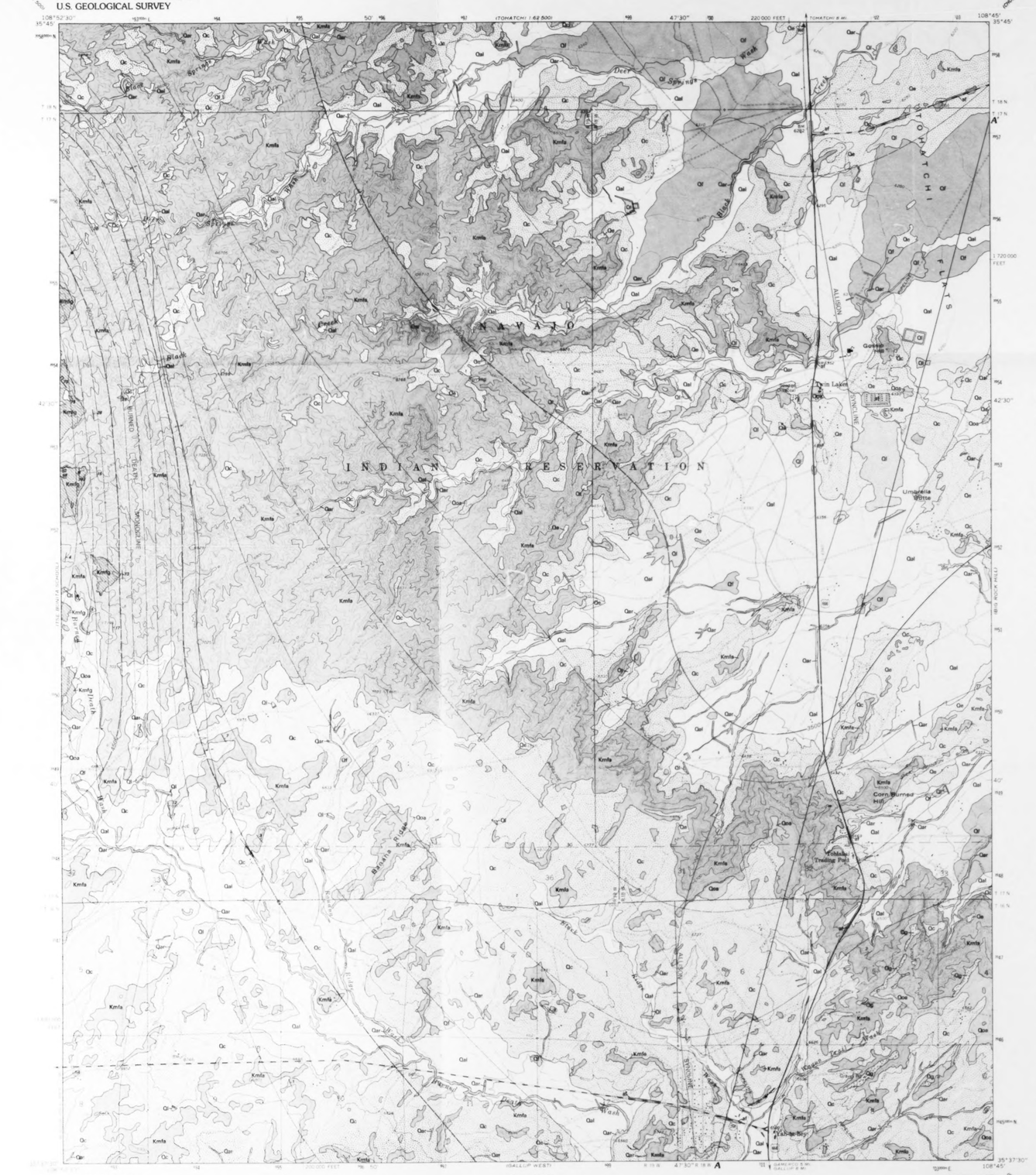
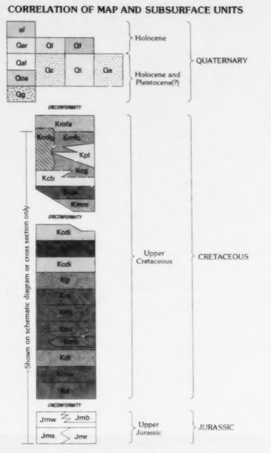
DEPARTMENT OF THE INTERIOR
U.S. GEOLOGICAL SURVEY

GEOLOGIC QUADRANGLE MAP
TWIN LAKES QUADRANGLE, NEW MEXICO
MAP GQ–1659



CORRELATION OF MAP AND SUBSURFACE UNITS



DESCRIPTION OF MAP AND SUBSURFACE UNITS

af **Artificial fill (Holocene)**

Qae **Arroyo deposits (Holocene)**—Pale-yellowish-brown to grayish-orange weathering alluvium deposited in arroyos since inception of the most recent cycle of arroyo cutting (circa 1850) (Bryan, 1954)

Ql **Lacustrine deposits (Holocene)**—Sand and silt deposited in natural and artificial lakes; during dry periods material is reworked by eolian processes

Qaf **Alluvial-fan deposits (Holocene)**—Pale-yellowish-brown to grayish-orange weathering unconsolidated alluvium deposited on valley floors as alluvial fans; during dry periods material is reworked by eolian processes. Superposed fans are mapped separately with no attempt to distinguish depositional sequence

Qal **Alluvial deposits (Holocene and Pleistocene?)**—Pale-yellowish-brown to grayish-orange weathering unconsolidated sand, silt, and gravel deposited prior to inception of the most recent cycle of arroyo cutting (circa 1850) (Bryan, 1954)

Qc **Colluvium (Holocene and Pleistocene?)**—Intermixed, unconsolidated talus and sand, silt, and gravel slope-wash deposits that become finer grained downslope and grade into alluvial deposits (Qal); mapped only in areas where forms a significant and continuous cover that obscures underlying bedrock

Qt **Talus deposits (Holocene and Pleistocene?)**—Large, unconsolidated angular rock fragments which accumulate locally at the base of cliffs and cover underlying bedrock

Qe **Eolian deposits (Holocene and Pleistocene?)**—Pale-yellow-brown to pale-orange unconsolidated sand and silt. Mapped where thicker than 1 m (3.3 ft) or where represents areally significant cover of underlying map units; locally contains reworked alluvial and residual soil material

Qoa **Older alluvial deposits (Holocene and Pleistocene?)**—Pale-yellow-brown to gray and pale-reddish-brown weathering sand, silt, and gravel deposits which are remnants of dissected alluvial fans(?) and older alluvial surfaces(?); topographically higher than younger alluvial deposits (Qar, Qal)

Qg **Gravel deposits (Holocene and Pleistocene?)**—Brown to reddish-brown sand and gravel deposits containing dark-red and gray quartzite pebbles as much as 13 cm (5 in.) in diameter set in a poorly sorted, moderately indurated sandstone matrix. Mapped on drainage divides and as caps on mesas topographically higher than arroyo and alluvial deposits (Qar, Qoa, Qal)

Menefee Formation (Upper Cretaceous—Campanian Age)—As revised by Peterson and Kirk (1977)

Kmfa **Allison Member**—A variable interbedded sequence of predominantly yellowish gray and dusky yellow to olive gray weathering shale and minor siltstone; very pale orange to pale-yellowish-brown, very fine to medium-grained, moderately well to poorly sorted, crossbedded, calcareous, lenticular sandstone; very minor carbonaceous shale; and a few lenticular subbituminous coal beds less than 35 cm (14 in.) thick. Upper portion has been removed by erosion. Lower contact is gradational and interfingers with the Cleary Coal Member of the Menefee (Kmfc). Distinguished from Cleary Coal Member by the absence of coal beds more than 35 cm (14 in.) thick; this distinction follows usage of Sears (1925) who subdivided coal-bearing units based on the presence or absence of mineable coal. The contact between Cleary and Allison Members is approximately locally because it commonly changes stratigraphic position with the changing character and distribution of coal beds; it is however, useful in separating the coal-bearing part of the formation from the relatively barren part. Thickness as much as 368 m (1,207 ft)

Kmfg **Cleary Coal Member**—Shown on cross section and schematic diagram only. A variable interbedded sequence of predominantly yellowish gray to medium-bluish-gray shale and siltstone; lenticular very fine to medium-grained poorly sorted very pale orange and moderate-orange-pink sandstone; dark-gray carbonaceous shale; lenticular subbituminous coal beds (most less than 35 cm (14 in.) thick but some as thick as 1.9 m (6.2 ft)) and thin dark-gray and brown iron-rich concretionary beds. Interfingers with the underlying Point Lookout Sandstone (Kpl). Mapped with the Gibson Coal Member of the Crevasse Canyon Formation as an undivided unit (Kmfg) southwest of the depositional pinchout of the Point Lookout Sandstone. Thickness 79–81 m (260–266 ft)

Kmfg **Cleary Coal Member of the Menefee Formation and Gibson Coal Member of the Crevasse Canyon Formation undivided (Upper Cretaceous)**—A variable interbedded sequence of predominantly yellowish gray to medium-bluish-gray shale and siltstone which locally weathers light to silvery gray; lenticular very fine to medium-grained poorly sorted very pale orange and moderate-orange-pink sandstone; dark-gray carbonaceous shale; lenticular subbituminous coal beds and thin dark-gray and brown iron-rich concretionary beds. Some coal beds have burned at the outcrop altering overlying rocks to form clinker beds or zones. Two members combined southwest of depositional pinchout of the Point Lookout Sandstone (Kpl) because they have similar lithology and lateral stratigraphic continuity, and represent essentially continuous deposition. Follows precedent set by Sears and others (1941, p. 114) and O'Sullivan and others (1972, p. 45) for delineation of geologic contacts; member names in accord with the revised nomenclature of Mesaverde Group as outlined by Beaumont and others (1956). Estimated thickness of the combined members 129–200 m (425–655 ft)

Kpl **Point Lookout Sandstone (Upper Cretaceous—Campanian and Santonian Age)**—Shown on cross section and schematic diagram only. Yellowish-gray to very pale orange very fine to fine-grained well-sorted calcareous sandstone. Represents the combined Point Lookout Sandstone and Hosta Tongue of the Point Lookout Sandstone as mapped in quadrangles to the east (Robertson, 1986; Kirk and Sullivan, 1987; Kirk and Zech, 1987 a, b, 1984), but because of the absence of the Satan Tongue of the Mancos Shale they cannot be differentiated in this quadrangle. Occurs in subsurface in the northeast corner of quadrangle. Thickness 0–19 m (0–62 ft)

Kcg **Crevasse Canyon Formation (Upper Cretaceous)**—As revised by Beaumont and others (1956)

Gibson Coal Member (Santonian Age)—Shown on cross section and schematic diagram only. Interbedded light- to dark-gray shale and siltstone, lenticular very fine to medium-grained very pale orange to orange-pink crossbedded sandstone; minor dark-gray carbonaceous shale, thin lenticular subbituminous coals (most less than 35 cm (14 in.) thick; some as thick as 3.8 m (12.4 ft)), and thin iron-rich concretionary beds. Interfingers with the underlying Bartlett Barren Member (Kcb). Mapped with the Cleary Coal Member as an undivided unit (Kmfg) southwest of the depositional pinchout of the Point Lookout Sandstone (Kpl). Thickness 69–87 m (225–285 ft)

Kcb **Barlett Barren Member (Santonian Age)**—Shown on cross section and schematic diagrams only. Interbedded sequence of predominantly yellowish gray shale and siltstone; very pale orange to pale-yellowish-brown and white, very fine to medium-grained, moderately well to poorly sorted, lenticular, calcareous sandstone and very minor amounts of carbonaceous shale and lenticular subbituminous coal beds which are less than 35 cm (14 in.) thick. Interfingers with overlying Gibson Coal Member (Kcg) and underlying Dalton Sandstone Member (Kcda). Thickness 54–75 m (177–246 ft)

Kmm **Dalton Sandstone Member (Santonian Age)**—Shown on cross section and schematic diagram only. Yellowish-gray to very pale orange, very fine to fine-grained, well-sorted, calcareous sandstone. Pinches out to southwest between the Bartlett Barren Member (Kcb) and the Dilco Coal Member (Kcdi). Thickness 0–24 m (0–80 ft)

Kcdi **Dilco Coal Member (Coniacian Age)**—Shown on cross section and schematic diagram only. Interbedded light- to dark-gray and variegated shale and siltstone; very fine to medium-grained, moderately well to poorly sorted, white to very pale orange lenticular (channel) sandstone; very fine to fine-grained, well-sorted, white to very pale orange (splay) sandstone; minor carbonaceous shale and lenticular subbituminous coal beds. Most coal beds are less than 35 cm (14 in.) in thickness; some are as thick as 90 cm (36 in.). Thickness 67–138 m (220–455 ft)

Mancos Shale (Upper Cretaceous)

Kmm **Molatto Tongue (Santonian Age)**—Shown on cross section and schematic diagram only. Light-gray to dark-yellowish-brown fissile shale and mudstone; thin interbeds of very pale orange to brown, fine-grained, well-sorted calcareous sandstone. Pinches out to the southwest and is unconformable with underlying Dilco Coal Member (Kcdi). Thickness 0–26 m (0–85 ft)

Kmc **Main body (Campanian to Turonian Age)**—Shown on cross section and schematic diagram only. Light- to dark-gray fissile shale with minor amounts of interbedded siltstone and some scattered thin discontinuous limestone and calcareous sandstone beds. Thickness 101–109 m (330–358 ft)

Kmj **Juana Lopez Member (Turonian Age)**—Shown on cross section and schematic diagram only. Interbedded thin fossiliferous limestone, fine-grained calcareous sandstone, and dark-gray fissile shale. Distinctive marker zone on geophysical logs. Thickness 3–21 m (10–69 ft)

Kmc **Lower part (Coniacian, Turonian, and Cenomanian Age)**—Shown on cross section and schematic diagram only. Light- to dark-gray fissile shale with minor amounts of interbedded siltstone, scattered thin discontinuous limestone beds, calcareous sandstone beds, and thin bentonite beds. Thickness 15–20 m (50–65 ft)

Kmb **Bridge Creek Limestone Member (Turonian Age)**—Shown on cross section and schematic diagram only. Interbedded thin, fossiliferous limestone and dark-gray fissile shale. Distinctive marker zone on geophysical logs. Changed from Greenhorn Limestone Member to Bridge Creek Limestone Member by Hook and Cobban (1981). Thickness 0–4 m (0–13 ft)

Kmw **Whitewater Arroyo Tongue (Cenomanian Age)**—Shown on cross section and schematic diagram only. Yellowish-brown to yellowish-gray fissile shale, locally contains beds of light-brown sandy siltstone and limestone. Thickness 12–17 m (40–56 ft)

Gallup Sandstone (Upper Cretaceous)—For description and discussion see Sears, 1925; Sears and others, 1941; and O'Sullivan and others, 1972; Molenaar, 1973; Kirk and others, 1978)

Kgt **Torrivio Member (Coniacian Age) (Molenaar, 1973)**—Shown on cross section and schematic diagram only. White to very pale orange and locally grayish pink, poorly sorted, fine- to coarse-grained, locally conglomeratic, feldspathic lenticular sandstone. Thickness 13–26 m (42–85 ft)

Kg **Main body (Coniacian and Turonian Age)**—Shown on cross section and schematic diagram only. Grayish-pink to very pale orange, very fine to fine-grained, well-sorted, calcareous sandstone. Interfingers with main body of the Mancos Shale (Km). Lower contact gradational. Thickness 43–49 m (140–160 ft)

Dakota Sandstone (Upper Cretaceous—Cenomanian Age)

Kdt **Twowells Tongue**—Shown on cross section and schematic diagram only. Yellowish-brown to tan, very fine to medium-grained, well-sorted, calcareous sandstone. Contains fossiliferous oyster beds (*Gryphaea newberryi* and *Exogyra* sp.). Thickness 15–20 m (49–65 ft)

Kd **Main body**—Shown on cross section and schematic diagram only. Upper part, light-gray to tan, fine- to medium-grained, moderately well sorted, silica cemented, quartzrose sandstone; lower part, interbedded light- to dark-gray carbonaceous shale and light-gray to white and tan coarse-grained, poorly sorted sandstone and conglomerate. Thickness 29–40 m (95–130 ft)

Morrison Formation (Upper Jurassic)

Jmb **Brushy Basin Member**—Shown on schematic diagram only. Green and grayish-green locally mottled red and purple claystone; thin dark-green fine-grained well-sorted siliceous sheet sandstone and white fine- to medium-grained lenticular crossbedded sandstone. Thickness 0–55 m (0–180 ft)

Jmv **Westwater Canyon Member**—Shown on schematic diagram only. Very pale orange and light-gray to pink fine- to coarse-grained, conglomeratic, poorly sorted subangular to subrounded feldspathic sandstone and arkose. Thickness 47–107 m (155–350 ft)

Jms **Unnamed sandstone**—Shown on schematic diagram only. Yellowish-gray to white fine- to medium-grained well-sorted, crossbedded eolian sandstone. Formerly mapped as Cow Springs Sandstone, Zuni Sar.-stone, and Bluff Sandstone. Regional correlations uncertain. Thickness unknown

Jmr **Recapture Member**—Shown on schematic diagram only. Reddish-brown clayey siltstone, locally mottled green, gray, and purple, and reddish-brown very fine grained sandstone, interbedded with some white and light-gray very fine to medium-grained well-sorted lenticular crossbedded sandstone. Thickness unknown

Contact—Dashed where approximately located

Fault—Dashed where approximately located; dotted where concealed; *x*, intrusion by sandstone dike

Strike and dip of beds

Strike of vertical joints

Earth dam or dike

Coal bed—Thickness measured in centimeters

Monoclinal fold—Showing upper and lower fold axes. Arrows indicate direction of dip

Syncline—Trace of axial plane with direction of plunge

Structure contours—Drawn on base of Dakota Sandstone. Dashed where approximately located; contour interval 100 ft. National Geodetic Vertical Datum of 1929

DISCUSSION

STRUCTURE

The Twin Lakes quadrangle is located approximately 11 km (7 mi) north of Gallup, New Mexico. The quadrangle lies at the mouth of the Gallup sag, a large structural embayment or syncline on the southern edge of the San Juan Basin. The Gallup sag is bounded by the Nutria monocline on the east and the Defiance monocline on the west. The Allison syncline forms the well-defined north-plunging axis of the Gallup sag in the quadrangle and can be seen in the structure contours as the large, broad trough in the center of the quadrangle. The Burned Death monocline in the western part of the quadrangle lies in the Gallup sag and has approximately 305 m (1,000 ft) of structural relief. Both the upper and lower monoclinal axis may easily be seen in outcrops in the canyons north of Burned Death Wash. Approximately 6.8 km (4.1 mi) northwest, in the Crevasse Canyon quadrangle, this monocline merges strootthly with the Defiance monocline. To the south the monocline abruptly ends at the intersection with Burned Death Wash; any evidence of structural control on its termination is covered by colluvium and alluvium.

Only a few small normal faults with relatively small displacements occur in the quadrangle. These faults are probably intraformational, forming from differential compaction and dewatering soon after deposition of the host rock. Commonly sandstone dikes as thick as 35 cm (1.1 ft) are intruded into the fault plane. Slickensides, mullion structures, and bedding structures are commonly perserved on the faces of the sandstone dike.

The Allison Member of the Menefee Formation (Kmfa) crops out across most of the quadrangle and is composed of splay sandstones, channel sandstones, and fine-grained overbank deposits. These lithologies commonly have nonparallel upper and lower bounding surfaces and have undergone small-scale intraformational deformation (differential compaction, slumping, and dewatering). This produces subtle strike and dip inconsistencies in the formation and make reliable surface structural measurements almost impossible to obtain in areas of low structural relief. Consequently, structure contours in this quadrangle are drawn on the base of the Dakota Sandstone. They are derived from 21 drill holes in primarily the eastern half of the quadrangle and projected from surface measurements in areas of high to moderate structural relief on or near the Burned Death monocline. The dashed contours in the southwest part of the quadrangle were projected from the Burned Death monocline area on the basis of sandstone outcrop patterns seen in air photos.

GEOMORPHOLOGY

A drainage divide crosses the quadrangle from northwest to southeast. Surface water in the northern two-thirds of the quadrangle drains north to the Chaco River and the remaining part of the area drains south to the Puerco River. However, ground water probably follows structure and flows north toward the center of the San Juan Basin.

The surface water drainage divide has migrated south and west as a result of the ability of the northern Chaco River drainage system to maintain and extend its valleys at a lower level than the Puerco River system. Valleys in the northeast part of the quadrangle which have been extended by headward erosion, are high in relief, steep, V-shaped in cross section, and devoid of alluvium and colluvium. Evidence suggests that the southern Puerco River drainage system is older than the Chaco River system because of its more mature low topographic relief and abundant deposits of colluvium and alluvium; accumulations of alluvium and colluvium in the southern drainage system may be in part due to a loss of tributaries to the northern drainage system and subsequent aggradation.

The quartzite gravels in the Puerco River drainage system represent material reworked and transported from the Defiance uplift area. Because none of the present streams drain the Defiance area and these gravels occur along drainage divides, they are probably deposits from an older surface and are older than other Quaternary deposits in the quadrangle.

Except for the silica-cemented sandstone dikes, siderite-cemented distributary(?) channel sandstones of the Menefee Formation are the most erosion resistant lithology in the quadrangle. Trough crossbeds are well preserved in the channel sandstones and indicate a paleoflow in a north and northeast direction. These elongate sandstone bodies commonly form sandstone caps for many of the small ridges and are probably responsible for the dominate north to northeast alignment of many small ridges (such as, Banana Ridge and Corn Burned Hill) and small interridge valleys.

ECONOMIC GEOLOGY

In the area of the Twin Lakes quadrangle much of the coal, in particular thick laterally extensive coal, occurs in the middle and lower parts of the combined Cleary Coal and Gibson Coal Members. Because only the upper part of the combined Cleary and Gibson crops out in the quadrangle and because the combined Cleary and Gibson is more than 1,000 ft deep throughout most of the quadrangle, surface mining is not considered economically feasible. If relatively thick coal beds, such as those being mined in the McKinley mine to the west, are present in the subsurface, coal bed methane may exist in the quadrangle.

Deposits of competent aggregate material are uncommon in this part of the San Juan Basin. The gravel deposits in the quadrangle are composed of red, black, and white quartzite cobbles ranging in size from 3 to 18 cm (1 2–6 5 in.) in diameter and supported in a matrix of unconsolidated to poorly cemented sand and silt. Although the deposits are small, they have potential as local sources of aggregate for roads and building material. One of these gravel deposits (sec. 8, T. 16 N., R. 18 W.) has been partially mined for aggregate.

Ground water for domestic use in the quadrangle is produced from the Point Lookout Sandstone, Dalton Sandstone Member of the Crevasse Canyon Formation, Gallup Sandstone, Dakota Sandstone, and Westwater Canyon Member of the Morrison Formation. The largest production (water comes from the Gallup Sandstone, several water wells for the town of Gallup are located along the axis of the Allison syncline from Yah-ta-hey to the boundary of the Navajo Indian Reservation. These aquifers are probably recharged from outcrops on the margins of the Gallup sag.

REFERENCES

Beaumont, E. C., Dane, C. H., and Sears, J. D., 1956, Revised nomenclature of the Mesaverde Group in the San Juan Basin, New Mexico: American Association of Petroleum Geologists Bulletin, v. 40, no. 9, p. 2149–2162.

Bryan, Kirk, 1954, The geology of Chaco Canyon, New Mexico: Smithsonian Miscellaneous Collections, v. 122, no. 7, 65 p.

Hook, S. C., and Cobban, W. A., 1981, Late Greenhorn (mid-Cretaceous) discontinuity surfaces, southwest New Mexico, *in* Hook, S. C., compiler, Contributions to mid-Cretaceous stratigraphy of New Mexico: New Mexico Bureau of Mines and Mineral Resources Circular 180, 35 p.

Kirk, A. R., Huffman, A. C., Jr., Zech, R. S., Robertson, J. F., and Jackson, T. J., 1978, Review of the history of usage of the Gallup Sandstone and related units, southern and western San Juan Basin, New Mexico: U.S. Geological Survey Open-File Report 78-1055, 51 p.

Kirk, A. R. and Sullivan, M. W., 1987, Geologic map of the Dalton Pass quadrangle, McKinley County, New Mexico: U.S. Geological Survey Geologic Quadrangle Map GQ–1593, scale 1:24 000.

Kirk, A. R., and Zech, R. S., 1984, Geologic map of the Oak Spring quadrangle, McKinley County, New Mexico: U.S. Geological Survey Geologic Quadrangle Map GQ–1583, scale 1:24 000.

———1987a, Geologic and structure contour maps of the Big Rock Hill quadrangle, McKinley County, New Mexico: U.S. Geological Survey Geologic Quadrangle Map GQ–1594, scale 1:24 000.

———1987b, Geologic map of the Hard Ground Flats quadrangle, McKinley County, New Mexico: U.S. Geological Survey Geologic Quadrangle Map GQ–1592, scale 1:24 000.

Molenaar, C. M., 1973, Sedimentary facies and correlation of the Gallup Sandstone and associated formations, northwestern New Mexico, *in* Fassett, J. E., ed., Cretaceous and Tertiary rocks of the southern Colorado Plateau: Four Corners Geological Society, Memoir, p. 86–110.

O'Sullivan, R. B., Repenning, C. A., Beaumont, E. C., and Page, H. G., 1972, Stratigraphy of the Cretaceous rocks and the Tertiary Glo Alamo Sandstone, Navajo and Hopi Indian Reservations, Arizona, New Mexico, and Utah: U.S. Geological Survey Professional Paper 521-E, 65 p.

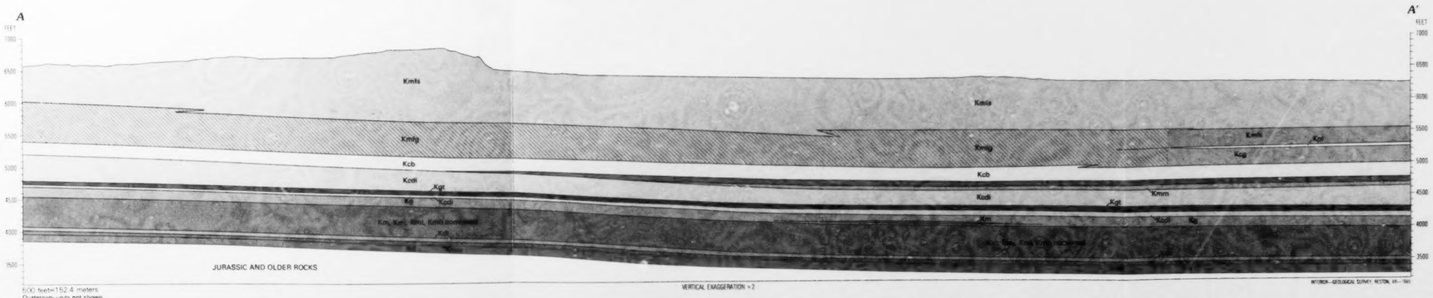
Peterson, Fred, and Kirk, A. R., 1977, Correlation of the Cretaceous rocks in the San Juan, Black Mesa, Kaiparowits, and Henry Basins, southern Colorado Plateau, *in* Fassett, J. E., ed., New Mexico Geological Society Guidebook 28th Annual Field Conference, San Juan Basin, p. 167–178.

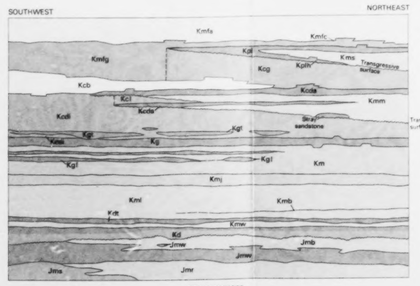
Robertson, J. R., 1986, Geologic map of the Crossroads quadrangle, McKinley County, New Mexico: U.S. Geological Survey Geologic Quadrangle Map GQ–1596, scale 1:24 000.

Sears, J. D., 1925, Geology and coal resources of the Gallup-Zuni Basin, New Mexico: U.S. Geological Survey Bulletin 767, 53 p.

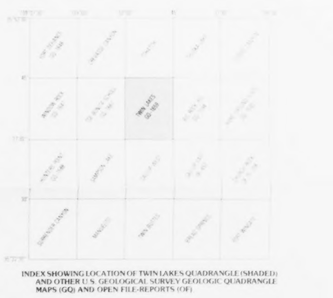
Sears, J. D. Hunt, C. B., and Hendricks, T. A., 1941, Transgressive and regressive Cretaceous deposits in southern San Juan Basin, New Mexico: U.S. Geological Survey Professional Paper 193-F, p. 101–121.

Zech, R. S., 1982, Paleosubstrates in the Upper Cretaceous Point Lookout Sandstone, southern San Juan Basin, New Mexico: U.S. Geological Survey Open-File Report 82-135, 32 p.





SCHEMATIC DIAGRAM SHOWING REGIONAL STRATIGRAPHIC RELATIONSHIPS OF MAPPED AND SUBSURFACE UNITS AND THEIR DEPOSITIONAL ENVIRONMENTS. The Satan Tongue of Mancos Shale (Kms), Hosta Tongue of Point Lookout Sandstone (Kpl), the unnamed tongue of Crevasse Canyon Formation (Kcf), the "stray sandstone" of Sears, Hunt, and Hendricks (1941), and lower sandstones of the Gallup (Kgl) as shown above are not present in this quadrangle. All the other symbols are explained in the Description of map units. Not all stratigraphic relationships shown are present in this quadrangle.



INDEX SHOWING LOCATION OF TWIN LAKES QUADRANGLE (SHADED) AND OTHER U.S. GEOLOGICAL SURVEY GEOLOGIC QUADRANGLE MAPS (GQ) AND OPEN FILE-REPORTS (OF)

INDEX SHOWING DENSITY OF DRILL-HOLE DATA IN THE TWIN LAKES QUADRANGLE, NEW MEXICO. The number in each block is the number of geophysical logs used for structure contouring in the outlined area; a total of 21 logs were used in contouring.

For sale by U.S. Geological Survey Map Distribution, Box 25286, Federal Center, Denver, CO 80225

GEOLOGIC MAP OF THE TWIN LAKES QUADRANGLE, McKINLEY COUNTY, NEW MEXICO

By
Robert S. Zech

1989

best copy available

MAP HA-708

DEPARTMENT OF THE INTERIOR
U.S. GEOLOGICAL SURVEY

FLOW CHARACTERISTICS FOR SELECTED STREAMS IN THE GREAT PLAINS SUBREGION OF THE CENTRAL MIDWEST REGIONAL AQUIFER SYSTEM AND SELECTED ADJACENT AREAS—KANSAS AND NEBRASKA, AND PARTS OF COLORADO, IOWA, MISSOURI, NEW MEXICO, OKLAHOMA, SOUTH DAKOTA, TEXAS AND WYOMING.

By E. R. Hedman and G. B. Engel

HYDROLOGIC INVESTIGATIONS ATLAS
Published by the U.S. Geological Survey, 1989

HEDMAN AND ENGEL—FLOW CHARACTERISTICS, GREAT PLAINS SUBREGION, CENTRAL MIDWEST U.S. 1:1,000,000 MAP HA-708